Dr. H. F. Parsons' Report to the Local Government Board on the Sanitary Condition of the Sutton Bridge Urban Sanitary District.

George Buchanan,
Medical Department,
March 9, 1880.

The present inspection, which was made in November 1879, was ordered by the Board to ascertain the sanitary condition of the Sutton Bridge Urban District; local complaints having been repeatedly made that the Sanitary Authority had systematically neglected the duties imposed upon them by the Public Health Act for the protection of the public health, and especially that they had not provided the district with proper sewers.

General Description.—Sutton Bridge, which is situated in Lincolnshire, on the borders of Norfolk, is a part of the parish of Long Sutton in the Holbeach Union, but for ecclesiastical and sanitary purposes is in a district of its own. It is a place of comparatively recent date, owing its existence to the rapid changes which in this part of England geological agencies and human ingenuity have effected in the relations of the land and water. Within the memory of persons now living there was at this spot only a group of outlying houses in the parish of Long Sutton, situated on the shore of an arm of the sea, a mile and a half wide, called Sutton or Cross Keys Wash, into which the river Nene emptied itself. Across this estuary there was at low water a track, interrupted by creeks and inlets, by which persons travelling between Long Sutton and Lynn were conducted by a guide on horseback. About the year 1830 a turnpike road was constructed between these two towns, which crossed the Wash at this point, and an embankment was thrown up, which served the double purpose of carrying the road and reclaiming from the sea the portion of the Wash south of it. The river Nene was confined within a narrow channel embanked at either side, and in order to carry the land traffic over it without interfering with the navigation, a swivel bridge was built. In 1850, the bridge, having been purchased by a railway company, was rebuilt so as to be available for both road and railway traffic, and facilities being afforded by the railway for the conveyance of merchandise inland, many ships came to unload their cargo at this point, instead of proceeding up the river to Wisbeach, seven miles higher. Hence the hamlet, formerly called Sutton Wash, as it grew into a town, took the name of Sutton Bridge.

Sutton Bridge is now some three and a half miles from the mouth of the river, successive portions of the shallow sea called the Wash having been first silted up by the river and tide, and then embanked and reclaimed. The river Nene here is thus confined between raised banks in a straight narrow artificial channel, in which the tide runs with great rapidity, rising and falling 18 feet at neap tides, and 26 feet at spring tides. The water is turbid, and at high water, salt. The surface of the country is on a dead level, and at high water the river rises several feet above it.

The soil for at least 50 feet in depth consists of a fine light sandy silt, somewhat ferruginous in places, containing occasionally recent marine shells and rounded waterworn lumps of clay; it is here and there loamy in texture, but without any clayey beds impervious to water. Hence there are no springs, but the subsoil, at a depth varying with the season and the distance from the river, is found charged with water. At the part of the district farthest from the river, the subsoil water, or "sock," as it is locally termed, is met with at a depth of from two to four feet below the surface, according to the dryness or wetness of the season, whereas near the river its level is several feet lower. The explanation appears to be that in each tide-period high water lasts for a much shorter time than low water; that is to say, if we take a point midway between high-water mark and low-water mark, the level of the river will be below this point for a considerably greater space of time in each day

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than it will be above it. Hence the outward soakage of the ground water into the river at low water is more than is counterbalanced by the soakage from the river into the ground at high water, and thus the sub-soil in the neighbourhood of the river is drained to a depth below mean tide level. The soil is fertile and mostly arable, and there is no undrained marshy land. Most of the property in the district belongs to Guy's Hospital, London.

The area of the district is about 8,707 acres. The population at the census of 1871 was 1,526, but has probably increased since then, and is now stated to be 2,081. The inhabitants are employed either in agriculture, or about the shipping.

Ships of nearly 2,000 tons burthen can come up to Sutton Bridge. Those that come to the port are almost exclusively sailing vessels, and are mostly engaged in the Baltic and coasting trade. Timber is the principal import.

Large docks are in course of construction on which some 150 navvies are employed. Some of these lodge in the town, others reside with their families in temporary wooden huts.

Streets and Dwellings.—The town of Sutton Bridge consists principally of a single irregular row of houses skirting the north side of a broad, straight turnpike road, which stretches away a mile and a half westward from the bridge. Near the bridge the houses are closer together, and there are a few back streets, Wharf Street and Custom House Street, north of the main road. Two plots of land on the north side of the high road have lately been laid out for building purposes, and on these new streets are springing up rapidly. To the west the houses get fewer and farther between, and in the tracts of country lying north and south of the high road, and in that part of the district east of the Nene there are only scattered farms and cottages. There are no back-to-back houses, and most of the houses have their own separate back yards, but although there is no crowding of houses together on the ground such as to interfere with the free play of air around them, yet many of the houses are so scantily provided with yard space that the necessary outbuildings are in most injurious proximity to the houses. A considerable portion of the long line of houses which constitutes Sutton Bridge appears to have been built on the waste ground by the roadside; the houses belong, in groups of two or three, to a number of small proprietors, each house having appertaining to it scarcely more ground than that which it covers, while the land at the back belongs to the Guy's Hospital estate.

The older cottages are very damp, the floors being of brick or stone, and frequently 6 inches or so below the level of the ground outside. There is no damp course at the base of the walls to prevent the rising of moisture from the ground, and the walls are also in some cases damp from defective eave-spouting, and in others from the mortar with which they were built having being made with sea sand, the salt in which forms with the lime of the mortar a deliquescent salt, chloride of calcium. The bedrooms are often garrets only 6 feet high, with sloping sides and small dormer windows.

The new houses are more roomy and are built on a better plan, but some are scandalous examples of "jerry building," the external walls being in part only half a brick in thickness, and the mortar being nothing but incoherent dirt, which crumbles into powder between the fingers on the slightest pressure. A damp course of tar is inserted in some cases, but by no means in all. Little, if any, supervision appears to be exercised over the erection of new houses after the plans are passed. One house in course of erection had the privy vault partly underneath it. The plans of this had been passed by the Sanitary Authority only on condition that the privy should be removed away from the house, but the builder had adhered to the original plans with but little alteration.

Sewerage and Drainage.—The greater part of Sutton Bridge is entirely without drainage. The only public sewer is one down Custom House Street, a street parallel to and near the river. This sewer, constructed of 12-inch socket pipes, ill-laid, discharges into a cesspool, from which a 6-inch pipe conveys the overflow into an open ditch without outlet, where it stagnates, the watery part evaporating or soaking away, leaving black, ill-smelling sediment behind. A sewer of 9-inch socket pipes has lately been laid down to drain two new streets, Queen Street and New Street. This sewer has its outfall into an open ditch, the bottom of which is lower than the bottoms of the "goatstocks" or conduits under the gateways, so that when the sewer

comes into use the ditch, which is about 150 yards from the street, must always be partly full of stagnant sewage. In part of the course of this sewer a 6-inch pipe with little fall, and which will have to drain 20 houses, opens into it so that unless efficient means of flushing be provided, the sewer is likely to be soon blocked up. In the remainder of Sutton Bridge there is no attempt at public drainage, the liquid refuse of the houses being thrown either into open ditches, upon the ash-heap, or more generally into what are locally called "dry wells." These dry wells are large cisterns or cesspools with loosely-bricked sides, whence the liquid soaks away into the porous soil, while the sediment accumulates, to be removed at long intervals. They are frequently within a few feet of the house doors, the inlet being either untrapped, or with an iron trap fitting loosely into the covering flag. They are also frequently within a few feet of the wells and rain-water cisterns. They have no means of ventilation other than the untrapped inlets. One of them, on the sediment being stirred up, gave forth an abominable stench which pervaded almost unbearably a row of six cottages. The cesspools of certain new houses are sealed down under a floor of asphalt, so that the ground air under the houses must be pervaded with the effluvia from them. One row of houses, of which the backyards are exceeding small, is drained into a cesspool on the Guy's Hospital land, which the Sanitary Authority empty at the public cost, and for which they pay an annual acknowledgment.

It was stated that the reason why the Sanitary Authority had not provided their district with sewers, as required by section 15 of the Public Health Act, was the difficulty of obtaining an outfall. The only outfall available without the expense of pumping is into the river Nene. The Sanitary Authority had made application to the River Nene Commissioners for permission to make an outfall sluice into the river, but had hitherto been unable to gain such permission, and were advised that without it, under section 327 of the Public Health Act, they had no power to make use of the river as an outfall. The Sanitary Authority were in doubt, whether, even if the assent of the Commissioners were obtained, it would be legal to discharge sewage into a river without previous purification. Apart from the question of legality, and looking at the matter only from a sanitary point of view, the use of the River Nene as an outfall does not seem open to objection, since the muddy and brackish waters of the river are not used for drinking or for any domestic purpose; while the volume of water is so large and the tide so rapid that it does not seem possible that the amount of sewage that would be likely to be poured into it from Sutton Bridge could cause a nuisance.

There is said to be about 15 feet of fall from the surface of the ground at the further end of the district to mean low-water mark in the River Nene at the bridge, a distance of over a mile.

Disposal of Excrement and Refuse.—There are in the district a few water-closets in the better class of houses; a few midden privies, introduced in connexion with new houses erected by builders from northern towns; and a row of houses provided with box closets, the boxes being of galvanized iron. With these exceptions the vault privy is in universal use in Sutton Bridge. In the older buildings the vault is of very large size, and usually covered only by the boards, often rotten, which form the privy floor; it is made of loose brickwork, so that the liquid sinks away into the porous earth, and the privy requires emptying only at long intervals: tenants who had occupied their houses for five years and eight years respectively stated that their privies had not been emptied since they had been there. The privy vaults now constructed are, as a rule, of smaller size, those on the Hospital estate being 4 feet in depth, $1\frac{1}{2}$ feet from front to back, *i.e.* the breadth of the privy seat, and 5 feet in length, so as to extend about a foot beyond the seat under the wall, in order that the vault may be reached from the outside for emptying, by taking up a flag. In other cases a vault and ashpit are constructed between two privies; the vault being under the ashpit, but separated from it by a brick floor.

The privies are frequently unventilated, and are filled with most pungent offensive effluvia from the accumulation of stale excrement in the vault. In hot weather the stench is said to be even worse than at the time of this inspection. In a few cases, however, the privy vault was ventilated by a tall

wooden pipe, and the freedom from offensive smell of these privies as compared with the rest was very remarkable.

Owing to the small amount of yard space with which many of the houses are provided, the privies are often much too near the houses, in some instances abutting on them close to the back doors; in these cases the privy has to be emptied through the house, unless the occupier of the land at the back will give permission for the nightsoil to be put over the fence and carried through his land. In one case it was necessary to break a hole through the wall of an outhouse whenever the privy was emptied, and in another to avoid carrying the nightsoil through the house, by the advice of the late Inspector of Nuisances, a hole was dug for it in the narrow shut-in back garden, where, covered up with ashes, it remains to this day.

There is almost always a separate privy to each house. The privies were in general kept clean, so far as the outside was concerned, though in one case the contents were leaking over the surface of the yard.

The ashes and house refuse are either thrown into ashpits or bins, generally open, or where these are not provided, into heaps in some corner of the premises. The ashpits were frequently overfull.

There is no public provision for the removal of nightsoil and refuse, except that the Sanitary Authority have lately bought a drum cart, which they let out for the purpose, charging 2*s.* 6*d.* for its use "to persons able to afford it," others having it free. The occupier of a farm across the bridge provides a man and horse to go with the cart, free of charge, taking the manure as payment. The manure is deposited in a heap by the river bank, away from any inhabited house.

Water Supply.—There is no public water supply in Sutton Bridge, other than six pumps belonging to the Local Board. One of these draws water from a rain-water cistern, supplied by the water off a granary roof; another, out of repair, from an open pond; another from a ditch by the roadside, the water of which is unfit for domestic use, and only used for watering the road; the others from shallow wells. Besides these there are numerous private pumps and wells, and almost every house has its rain-water cistern. The wells are shallow, and are not puddled, so that the water is drawn from near the surface of the porous bed of silt. Into this bed percolate the foul liquid contents of privy-vaults and "dry wells," so that filtration through a few feet of porous sand is relied on to transmute foul sewage into potable water. The rain-water cisterns are underground. They are of brick, set in cement, with arched roof and invert. One for a cottage would contain from 500 to 1,000 gallons. The cost of one holding 600 gallons is stated to be about 3*l.* The lids are frequently on a level with the yard surface, so that when the yard is washed there is a danger of the dirty water finding its way into the cistern under the edges of the lid.

In one instance where want of room could not be pleaded as an excuse, the cistern was only 7 feet from a cesspool which received the contents of a watercloset, and the liquid in the cesspool stood on a higher level than the water in the cistern. A facing of cement cannot be trusted to stand against a pressure of water behind it, so that when the water in such cisterns is low, leakages from the subsoil into the cistern are likely to occur. In one case complaint was made that the water in the cistern was unfit to drink through contamination with the soakage from a neighbouring privy vault.

In dry weather there is a scarcity of water, and rain-water is sold at the rate of three bucketfuls for a penny.

With a view to ascertain the quality of the existing supplies three samples of water were collected by me from public pumps as follows:

No. 1, from a pump on the south side of the high road near the Salutation Inn. This pump is supplied from a shallow-covered well by the roadside. There is a stagnant ditch in the neighbourhood, and there is no proper drainage to carry away the waste water from the pump, while the nearest privies are about 50 yards away. This water when freshly drawn was clear, with a chalybeate taste and smell, which it lost on standing, at the same time becoming turbid and throwing down a slight rusty sediment.

No. 2, from pump by the Primitive Methodist Chapel. There were four

vault privies within a radius of 16 yards from the well from which this sample was drawn, the nearest being only 8 yards distant.

No. 3, from pump at east end of Wharf Street, behind the Bridge Hotel. This pump draws water from an underground cistern supplied by the rain which falls on the roof of a neighbouring granary.

These samples were forwarded to Dr. Dupré, whose analyses, appended to this report, show that, as might be expected, numbers 1 and 2 were so highly charged with mineral and organic impurities as to be unfit for drinking, and from their excessive hardness, unsuitable for many domestic purposes. No. 3, on the other hand, was a soft water of moderate purity, and after filtration would constitute a fairly good water.

That people have for years used waters of the character of numbers 1 and 2 for drinking without obvious ill effects, does not prove that it is safe or wise to do so. Apart from the repulsiveness of the idea of drinking water contaminated with excremental and other filth, it cannot be guaranteed that water so contaminated may not at any time receive the specific infection of typhoid fever, cholera, and other diseases, which, in that case, are liable to be propagated wholesale among those who drink it.

There does not appear to be within the district any source of water suitable for a public supply. There is no stream but the brackish tidal Nene and the fen dykes. From the geological structure of the district, Artesian borings would probably be difficult to carry out, and give little prospect of success.

Mr. E. Easton, C.E., in a report, for the loan of which I am indebted to Mr. G. F. Young, of Sutton Bridge (see Appendix II.), considers that the most feasible mode of supplying the district with water would be to purchase water by meter from the Wisbech Water Company, whose Parliamentary powers extend to the adjacent parishes of Walpole St. Peter and Walpole St. Andrew. An inverted siphon would have to be used to carry the water under the River Nene. Mr. Easton recommends that the Urban Sanitary Authorities of Sutton Bridge, Long Sutton, and Holbeach, towns which lie in a line along the high road, should unite for the purpose of a common water supply.

Sanitary Administration.—The Local Government Act was adopted at Sutton Bridge in 1859. The Local Board, which is the Urban Sanitary Authority, consists of nine members, who meet once a month. The steward of the Guy's Hospital estate is chairman of the Local Board, and almost all the members are farmers and tenants of that estate.

The Urban Sanitary Authority have divided their district under section 211, clause 4, of the Public Health Act, 1875, into an "urban" and a "rural" part, the latter, which comprises most of the agricultural land, being exempted from the rates for lighting, &c.

The area, number of houses, population, and rateable value of these two divisions, as ascertained by a survey recently made by the Surveyor to the Urban Sanitary Authority, is as follows :—

	"Urban" Division.	"Rural" Division.
Area in acres - -	392	4,935
Houses { occupied - -	296	125
Houses { unoccupied - -	27	1
Inhabitants - -	1,475	606
Rateable value -	£1,950	£7,551

The Urban Sanitary Authority have appointed Mr. Alfred H. Haines, of Long Sutton, as their Medical Officer of Health. His appointment is not under the order of the Local Government Board, and his remuneration is at the rate of 5*s.* for each annual report, and 10*s.* 6*d.* for each time that his services are called into requisition by the Sanitary Authority. He transmits, however, to the Board copies of his annual reports ; and he makes, of his own accord, occasional inspections in the district, although by the terms of his appointment he is only required to do so when called upon by the Sanitary Authority. He receives from the Registrar of the subdistrict monthly returns of births and deaths.

Mr. Dawson, surveyor to the Guy's Hospital estate, has been appointed Surveyor and Inspector of Nuisances to the Urban Sanitary Authority, at a

salary of 20*l.* a year, for the part repayment of which the Sanitary Authority have not applied to the Local Government Board. He has, however, only held office during the past six weeks. Before that time the foreman or ganger of the road labourers, an old man of 70, who could neither read nor write, was supposed to act as Inspector of Nuisances, his wages being 18*s.* a week. His attention seems only to have been given to cases where complaints were made, and not always to those.

The Local Board adopted in 1860 a code of byelaws with respect to the meetings of the Local Board; to the duties of the officers; to common lodging houses; to new streets and buildings; to slaughter-houses; and to cleansing of footways, removal of refuse, cleansing of privies, and prevention of nuisances, but the very existence of these byelaws had, it appears, been forgotten until the appointment of the present surveyor. It is true that there was a custom that when new buildings were erected plans should be submitted to the Sanitary Authority, but as before said, no care seems to have been taken to ascertain that the buildings were carried out in accordance with the plans. The supervision of the construction of new streets and buildings is of the more consequence in Sutton Bridge, because there is a considerable amount of building going on. When the new docks are completed it is probable that the trade of Sutton Bridge will increase, and what is now scarcely more than a rural hamlet may grow into a town of considerable size. It is important, therefore, that a close watch should be kept over its growth, that streets should be properly laid out, new buildings properly constructed of good design, with good materials, and with a sufficient amount of air space; and provided with proper drainage and efficient means for the disposal of excrement and refuse. Attention to these points at the beginning costs little, and prevents evils which when they have once arisen can only be remedied, if at all, with much difficulty and at a great expense.

The Sanitary Authority have no apparatus for disinfection of clothing or bedding by heat.

There is no provision in the district for the isolation of persons suffering from infectious disease. The Wisbeach Town Council, who were appointed permanently the Port Sanitary Authority for the whole course of the river Nene from Wisbeach to its mouth, by a provisional order which was confirmed by Parliament in July 1879, propose to establish a hospital for persons suffering from infectious diseases, but the sanitary authorities of Sutton Bridge and the adjoining districts are unprovided with such accommodation. One of the sites proposed for the hospital is in the Sutton Bridge district, near the west bank of the river Nene, about a mile below the bridge. Negotiations for the purchase of ground are still in progress between the Port Sanitary Authority and the Governors of Guy's Hospital, to whom the land belongs.

Vital Statistics.—The causes of death during the past eight years and the first 10 months of the present year 1879, are given in the following table:—

TABLE 1.

Causes of Death.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879, 10 months.
Small-pox	1	1	—	—	—	—	—	—	—
Measles	1	1	—	—	—	1	—	—	—
Scarlet Fever	—	—	—	—	3	4	—	—	—
Diphtheria	—	—	—	—	1	1	—	—	1
Croup	—	—	—	—	1	—	—	—	—
Whooping Cough	—	—	—	—	—	—	—	—	—
Diarrhœa and English Cholera	—	—	—	—	3	—	—	1	—
Erysipelas	—	—	—	—	1	—	1	—	—
Rheumatic Fever	—	—	—	—	—	1	—	—	—
Remittent Fever (Ague ?)	2	—	—	—	—	—	—	—	—
Phthisis	9	5	7	5	2	4	3	3	5
Bronchitis, Pneumonia, and Pleurisy	—	5	2	2	1	2	6	4	9
Heart Disease	2	2	2	1	2	1	—	1	2
Injuries	1	—	—	—	—	1	2	2	1
Other Diseases	18	18	10	9	15	25	17	10	17
	34	32	21	17	29	40	29	21	35

The population of Sutton Bridge is too small for it to be worth while to give the birth and death rates for each year, but taking the whole of the above-mentioned period, the average yearly rates, as calculated on a mean population of 1,700, have been as follows :—

Birth-rate	-	30·0 per 1,000 living.
*Death-rate	-	16·8 „ „
Deaths under one year old	-	11·6 per 100 births.

It must be admitted that these rates are not high, all being below the average rates for England and Wales. Hitherto Sutton Bridge has been a rural hamlet rather than a town, having natural advantages in a situation near the sea, a porous soil, and a scattered arrangement of houses ; although little or nothing has been done by those upon whom the sanitary administration of the place has devolved to protect and supplement these advantages. Sutton Bridge cannot, however, be expected to continue to show a favourable bill of health in future, if it is allowed to grow into a town without any care or supervision over its development ; houses being erected without any regard to the principles of health, and the ground being allowed to become saturated with filth, polluting the air and drinking water. Moreover, in its present condition, Sutton Bridge is calculated to form a most favourable hotbed for the propagation of those diseases which are spread from household to household by the agency of polluted air and drinking-water. It has fortunately escaped any epidemic of this nature hitherto, but there is no security that this immunity will continue.

Sickness.—Ague, which was formerly prevalent, has now almost disappeared here, as in other similar districts, since the draining and cultivation of the Fens A few cases still occur occasionally.

The habit of opium eating is said to prevail largely among the elderly people. The certified cause of a death registered this year, was "habitual use of opium, intestinal obstruction, collapse."

Scarlet fever was prevalent in the district in the winter of 1875–76, and a few cases had recently occurred at the time of this inspection.

No deaths have been registered from enteric fever for nine years. One case only has come to the knowledge of the medical officer of health during the present year: the patient was a man employed in removing the nightsoil from privies.

In concluding this report, I have to thank the officers of the Sutton Bridge Local Board, for the assistance courteously rendered me during the course of this inspection.

H. FRANKLIN PARSONS, M.D.

Recommendations.

1. The Urban Sanitary Authority should take steps to carry out the duty imposed on them by the Public Health Act, of providing such sewers as may be necessary for the effectual draining of the district. For this purpose the Sanitary Authority will do well to secure the advice of a competent engineer. When public sewers have been provided the Sanitary Authority should compel the owners of all houses within the prescribed distance to drain their premises into them by properly constructed drains. When this is done, all dry wells and cesspools should be emptied and filled up with clean material.

2. The present offensive and dangerous system of privy vaults should be done away with, and some other system substituted in its place which is not open to the same objections of liability to taint the air, subsoil, and drinking-water. If fixed receptacles for excrement be retained they should be reduced to the smallest practicable dimensions, kept above the level of the ground, rendered watertight, covered in and ventilated ; they should also be emptied at frequent intervals.

Where, however, owing to the scantiness of yard space, the privies are unavoidably placed in close proximity to houses, or have to be emptied by

* In calculating the death-rate no account has been taken of the deaths of paupers removed into the Union Workhouse at Holbeach ; the number of these is however very small.

carrying the refuse through the house, some form of closet with pails or moveable receptacles, in which ashes or dry earth are used to cover and deodorise the excreta, will be found preferable. Waterclosets might be used with much advantage in such situations, but their use cannot be recommended until the district is provided with sewers and a public water supply.

The Sanitary Authority should see to the frequent and systematic removal of nightsoil and excrement from all inhabited premises. It will probably be found necessary that the Sanitary Authority should either undertake this duty, or contract with some person to do so.

3. When the district has been provided with sewers, and the house premises have been connected with them, and cesspools and privy vaults abolished, the well water will be less exposed than at present to the danger of contamination; but nevertheless, if the town increases in size and importance, as there seems to be some prospect of its doing, it will at some time be found advisable to provide a public supply of water laid on in pipes.

In the meantime careful watch should be kept over the wells and cisterns, public and private, from which the existing supply is drawn, and such as are found to be contaminated and dangerous to health, should either be repaired and protected against contamination, or closed, and a supply of wholesome water from another source substituted.

For drinking purposes filtered rainwater should be used in preference to the water from shallow wells.

4. Attention should be given by the Sanitary Authority to the duty imposed upon it by section 92 of the Public Health Act, 1875, to cause inspection of their district to be made from time to time with a view to ascertain what nuisances exist calling for abatement, and to enforce the provisions of that Act in order to abate the same. To this end the appointments of Medical Officer of Health, and of Inspector of Nuisances, should be placed on such a footing as to ensure that this duty shall be regularly and systematically carried out.

5. The byelaws should be carefully revised. Advantage should be taken of the additional powers which Urban Sanitary Authorities now possess under section 157 of the Public Health Act, 1875, to make provisions with respect to the structure of new buildings for purposes of health; for example, to require that a waterproof damp course shall be inserted in the walls, and that proper materials shall be used in the compounding of mortar. The Sanitary Authority should consider in this connexion the propriety of adopting the model byelaws issued by the Local Government Board.

The Sanitary Authority should, moreover, see that the byelaws are duly enforced. It should be the duty of the surveyor to supervise the erection of all new buildings, to ascertain that they are carried out in accordance with the byelaws and with the plans as approved by the Sanitary Authority.

6. Provision should be made by the Sanitary Authority for the isolation of persons suffering from infectious disease, who may be without proper lodging or accommodation, or who cannot be properly treated at their own houses. From its maritime position Sutton Bridge is at any time liable to the importation of cases of disease, which are as likely to manifest themselves after the patient has come ashore as while he is still afloat, and in that case will come under the jurisdiction of the Urban, and not the Port, Sanitary Authority.

The Urban Sanitary Authority will probably find it convenient to combine for the purpose with other adjoining authorities.

APPENDIX I.

REPORT on Three samples of Water received from Dr. H. Franklin Parsons on November 22, 1879.

SAMPLES contained in two Winchester Quarts each, stoppers tied over and secured by seal, seals unbroken, bottles labelled:

No. I. "(No. 1) Pump near Salutation Inn, Sutton Bridge."

No. II. "(No. 2) Pump near Prim. Meth. Chapel, Sutton Bridge."

No. III. ("No. 3) Pump at E. end of Wharf St., Sutton Bridge."

Samples I. and II. are excessively, hard owing to the large amount of lime and magnesia salts, both sulphates and carbonates, they contain; lime salts predominating in No. I., magnesia salts in No. II. The total dry residue amounts to 112 and 91·14 grains per gallon respectively, and this would of itself be sufficient to render the waters unsuitable for drinking, as well as for nearly all culinary and other domestic purposes. In addition to this they are largely contaminated by organic matter (in No. I. this appears to bo chiefly of vegetable origin, while in No. II. it is in great measure at least, animal) as evidenced by the somewhat large proportion of oxygen absorbed from permanganate, the extremely high proportion of ammonia, and of albuminoid ammonia, and in No. II., the large amount of nitric acid. The deposit in both waters is almost entirely mineral, in No. I. hydrated oxide of iron chiefly.. Both waters are totally unfit for drinking.

No. III. is a very soft water, of moderate purity, and free from any dangerous degree of pollution by sewage or surface draining. On standing it yields, however, a minute trace of deposit containing numerous minute animalculæ, and a variety of algæ, and should therefore not be used for drinking without previous careful filtration. After such filtration it will constitute a fairly good water.

The analytical details are given in table annexed:—

	No. I.	No. II.	No. III.
Appearance	Turbid.	Clear.	Very slightly turbid.
Colour	Brownish.	Greenish.	Pale brownish.
Taste	Tasteless.	Tasteless.	Tasteless.
Smell	Inodorous.	Inodorous.	Slightly musty.
Deposit	Some.	Minute trace.	Minute trace.
Nitrous acid	None.	Strong trace.	None.
Phosphoric acid	Very slight trace.	Very slight trace.	Very slight trace.
Metallic impurities	None.	None.	None.
Hardness before boiling	—	—	—
„ after „	—	—	—
	Grains per gallons.		
Oxygen absorbed from permanganate.	0·070	0·042	0·049
Total dry residue	112·00	91·14	5·88
Consisting of Volatile matters	7·84	5·60	1·29
Consisting of Fixed salts	104·16	85·54	4·59
Chlorine	18·51	11·18	0·56
Nitric acid	0·00	3·39	0·22
Ammonia	0·063	0·210	0·003
Albuminoid ammonia	0·021	0·013	0·007

(Signed) A. Dupré.

Westminster Hospital,
Nov. 29, 1879.

APPENDIX II.

9, Delahay Street, Westminster, S.W.,
November 11, 1879.

Sutton Bridge Water.

Dear Sir,

I now beg to forward you my report upon the proposed water supply to this district from the Wisbeach Waterworks Company.

The districts to be embraced in a schemo for the supply of water would consist of the parishes of Sutton Bridge, Sutton St. Mary's, Sutton Gedney, Fleet and Holbeach, the principal towns being Sutton Bridge, Sutton and Holbeach, all of which are in close proximity one to another, and are at present entirely dependent upon surface wells for their supply of water.

The populations of these three towns are respectively,—

Sutton Bridge	2,000
Sutton	2,500
Holbeach	3,000
	7,500

and allowing for the houses in the parishes of Fleet and Gedney on the main road between Holbeach and Sutton, on which the pipes will be laid, the total population may be taken at about 8,000.

Since the last Census was taken Sutton Bridge has considerably increased. The new Dock has been commenced, and several houses have already been built, and when it is open there is every reason to believe that the town will steadily increase both as regards the population and also in rateable value.

The Parliamentary limits of the Wisbeach Waterworks Company extends in the direction of Sutton Bridge to the boundary of the parishes of Walpole St. Peter's and Walpole St. Andrew's, and arrangements will have to be made with them to deliver daily at this point a sufficient quantity of water in bulk to meet the requirements of the new district to be supplied. From this point the water, after passing through a meter, would be brought to Sutton Bridge through a pipe having an inverted syphon under the river and discharging into a tank sufficiently high to allow the water to flow by gravitation into the several houses. A line of pipes will then be continued along the main road to Holbeach, passing through Sutton, and having branch pipes to distribute the water in the various streets.

The Wisbeach Waterworks Company at present supply the town of Wisbeach direct from their pumping station during the day, and thus provision in the size of the mains should be made so that when the supply for this new district becomes more extended, and pumping becomes necessary during longer hours to keep up the supply, more storage room could be obtained by erecting a second tank at some convenient place between Sutton and Holbeach.

The works which at first will be necessary will consist of 11,550 yards of 9″ pipe, 8,140 of 6″, and 6,600 of 3″, an inverted syphon under the bed of the river Nene, and a tower at Sutton Bridge with tank capable of holding 40,000, gallons, the total cost of which, including 10 per cent. for contingencies, I estimate at thirteen thousand four hundred and fifty pounds (13,450*l.*).

Allowing 15 gallons of water per head of the population to be supplied the quantity required would be 120,000 gallons daily. Only half this quantity, as the actual consumption however would, in all probability, be found sufficient for the first few years after the works were complete.

In fixing the rate per 1,000 gallons to be paid for the water delivered by the Wisbeach Company a minimum daily quantity will have to be determined upon to repay them interest on the outlay in extending their mains, and also to cover working expenses. For the purposes of this Report I have taken this minimum quantity at 60,000 gallons daily, and find that this could in all probability be obtained at the rate of 4*d.* per 1,000 gallons.

These works can be carried out either by the Sanitary Authority of the district under the powers given to them under the Public Health Act, 1875, or by a private company under Parliamentary powers.

The Public Health Authorities of Sutton Bridge, Sutton, and Holbeach consist of Urban Sanitary Authorities who levy a general highway rate over the whole parish, and a district rate for lighting and other improvements within a limited area round each town.

Under the Act referred to above, an Urban Sanitary Authority has power to provide their district with water and, for the purposes of constructing works, borrow money from the Public Works Loan Commissioners at the rate of 5½ per cent, repaying capital and interest in 30 years.

The rateable value of the three separate towns over which the district rate is laid amounts to about 12,000*l.*, and for the rest of the district 45,500*l.*

In the event of waterworks being constructed this latter part of the district would only be rated at one fourth of its full value.

Basing my calculations on these figures I find a rate of 1*d.* in the £ would produce annually the sum of 97*l.* 8*s.* To repay off capital and interest a sum of 730*l.* will be required, which, together with the cost of water, say 730*l.*, and 100*l.* for turncocks' wages and repairs, will bring the annual sum to be paid to 1,560*l.* Allowing an income of 200*l.* to be derived from those people using the water other than for domestic purposes there remains 1360*l.* to be raised as a general district rate, which will represent 1*s.* 2*d.* in the £ on the rateable, value of house property, and 3½*d.* for the Rural District.

Supposing, on the other hand, a company to be formed under Parliamentary powers, an additional 1,000*l.* will have to be added to the cost of the work for obtaining an Act of Parliament.

In addition to this the working expenses will be somewhat increased. To pay a dividend of 8 per cent. (which is the maximum dividend allowed under the recent Acts of Parliament) on the original capital, after allowing for the cost of the water and working expenses, it will be necessary to provide for a rental of rather more than 2,000*l.* per annum.

Deducting from this, say 200*l.* for large consumers, there remains 1,800*l.* to be derived directly from the rates which will involve a rate of nearly 3*s.* in the £, on the whole of the present rateable value of 12,000*l.* This rate when compared with those charged by other companies would be very excessive, and equal to nearly 5 per cent. on the present assessment.

Comparing these two methods for raising the funds for carrying out these works it is evidently to the interest of the inhabitants of the district that the works for the water supply and their control should be vested in the hands of the Sanitary Authority.

I shall be happy to reply to any further questions relating to this report,

And remain,

Yours faithfully,

for Edward Easton,

Martin W. B. Ffolkes.

To G. F. Young, Esq.,
Sutton Bridge, Lincolnshire.

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